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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/021,782
Filing Date: December 18, 2001
Appellant(s): TABERY ET AL.

Bernard P. Codd
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 3/29/06 appealing from the Office action mailed 10/07/04.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,242,292	Yamazaki et al.	6-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1 and 11 are sustained under 35 U.S.C. 102(e) as being anticipated by Yamazaki et al. US Patent 6,242,292 for the reasons of record.

Yamazaki discloses the semiconductor method as claimed. See **FIGS. 1-6B**, where Pertaining to claims 1 and 11, Yamazaki teaches a method of manufacturing a semiconductor device, comprising the steps of:

Step 1) "forming a gate electrode over the substrate;"

See figures **5**, **6A** and **6B** where these figures illustrate patterns of TFTs having a peripheral circuit **(51)** and a pixel circuit **(52)**, and as stated under **col. 9, lines 5-10 and 31**, the

gate electrode is discussed as well as the substrate (**11**). The gate is used as a mask on the substrate for subsequent implantation.

Step 2) "introducing ions into the substrate to form source/drain regions in the substrate proximate to the gate electrode;"

See figures **5**, **6A** and **6B**, and as stated under **col. 9**, **lines 27-33**, where it specifically states "an impurity ion for providing one conductivity type... is doped into source and drain regions by ion doping or plasma doping in a self-alignment using the gate electrode as a mask,"

Step 3) "activating a portion of the source/drain regions by laser thermal annealing using a laser;" In claim 11 specifically, "...using a pulse of laser energy..."

As stated in **col. 7**, **lines 50-60** and **col. 9**, **lines 24-50**, the process of the prior art is specifically drawn to activating the source/drain regions, where an annealing process is performed to activate the impurity ion introduced into the substrate to form the source/drain regions proximate the gate electrode. Specifically, as stated in **col. 9**, **lines 37-44**, "Annealing for activating the impurity ion is required." and, "The annealing process for the above purpose is conducted by irradiation of laser light." In addition, stated in **col. 7**, **lines 56-60**, are the laser energy and the number of pulses.

Step 4) "moving the laser and the substrate relative to one another;"

As stated in **col. 2**, **lines 11-16**, a definition of scanning is provided by the prior art of record, where scanning means that "the linear laser is superposedly irradiated while, displaced little by little", where the width of the laser beam exceeds the length of the substrate to be processed and where the scanning takes place relative to the substrate.

Furthermore, an interview dated May 20, 2003 was conducted in which the examiner asked the Attorney-of-Record for clarity regarding the limitation of "moving the laser and the substrate relative to one another". The Attorney-of-Record Scott Paul, replied that "it is relative to the frame of reference, for example, the laser can be stationary and the substrate can be moving." Because of the Attorney-of-Record's reply, the examiner was, and is lead to take the broadest interpretation of the claim language and by the previous statements in sections (a)-(d), was able to conclude that the prior art of record teaches that the substrate is moving and the laser is stationary, implying that they are moving relative to one another.

Step 5) "activating another portion of the source/drain regions by laser thermal annealing using the laser," In claim 11 specifically, "… using another pulse of laser energy from the laser"

(a) As stated in **col. 7**, **lines 50-60** and **col. 9**, **lines 24-50**, the process of the prior art is specifically drawn to activating the source/drain regions, where an annealing process is performed to activate the impurity ion introduced into the substrate to form the source/drain regions proximate the gate electrode. Specifically, as stated in **col. 9**, **lines 37-44**, "Annealing for activating the impurity ion is required." And, "The annealing process for the above purpose is conducted by irradiation of laser light."

(b) Further, as stated in **col. 8**, **lines 47-62**, **col. 10**, **lines 1-6**, "The linear laser light is irradiated while the direction of the source and drain regions of the TFT is coincident with the

line direction of the linear laser light, whereby the crystal state in the carrier moving direction can be made uniform." This statement confirms "activating another portion of the source/drain regions by laser thermal annealing using a laser", since the source and drain regions coincide with the line direction of the laser, the carriers move in a region having uniform crystallinity where by connecting the source and drain regions of each TFT, high mobility regarding the electrical characteristics of the TFTs can be obtained. Additionally, since the laser beam is a scanning beam, it is inherent that the beam will activate "another portion" or different portions of the source/drain regions as the beam moves along the substrate. See **col. 8, lines 30-54**; **col. 9, lines 44-50** and **58-67**; **col. 10, lines 1-5** and **FIG. 5**, wherein the laser moves over the transistor source/drain regions to form crystallinity between the source/drain regions.

(c) finally, stated in **col. 7, lines 56-60**, addresses the laser energy and the number of pulses (pulse width 30 ns, 30 pulses/s). It is inherent that since the laser beam is a scanning beam, the beam will activate another portion of the source/drain regions using another pulse of laser energy as the beam moves over the source/drain region.

Step 5) "activating another portion of the source/drain regions by laser thermal annealing using the laser," In claim 11 specifically, "... using another pulse of laser energy from the laser"

(a) As stated in **col. 7, lines 50-60** and **col. 9, lines 24-50**, the process of the prior art is specifically drawn to activating the source/drain regions, where an annealing process is performed to activate the impurity ion introduced into the substrate to form the source/drain regions proximate the gate electrode. Specifically, as stated in **col. 9, lines 37-44**, "Annealing for activating the impurity ion is required." And, "The annealing process for the above purpose is conducted by irradiation of laser light."

(b) Further, as stated in **col. 8, lines 47-62, col. 10, lines 1-6**, "The linear laser light is irradiated while the direction of the source and drain regions of the TFT is coincident with the line direction of the linear laser light, whereby the crystal state in the carrier moving direction can be made uniform." This statement confirms "activating another portion of the source/drain regions by laser thermal annealing using a laser", since the source and drain regions coincide with the line direction of the laser, the carriers move in a region having uniform crystallinity where by connecting the source and drain regions of each TFT, high mobility regarding the electrical characteristics of the TFTs can be obtained. Additionally, since the laser beam is a scanning beam, it is inherent that the beam will activate "another portion" or different portions of the source/drain regions as the beam moves along the substrate. See **col. 8, lines 30-54**; **col. 9, lines 44-50** and **58-67**; **col. 10, lines 1-5** and **FIG. 5**, wherein the laser moves over the transistor source/drain regions to form crystallinity between the source/drain regions.

(c) finally, stated in **col. 7, lines 56-60**, addresses the laser energy and the number of pulses (pulse width 30 ns, 30 pulses/s). It is inherent that since the laser beam is a scanning beam, the beam will activate another portion of the source/drain regions using another pulse of laser energy as the beam moves over the source/drain region.

Step 6) "wherein each pulse from the laser respectively irradiates non-identical portions of the source/drain regions." In Claim 11 specifically, "…after each pulse of laser energy and each portion of the source/drain regions receives more than one single pulse of energy…"

(a) As stated under **col. 7, lines 50-55**, "the substrate (sample) on which the silicon film is formed is placed on the stage and the laser light is irradiated onto the whole surface of the

substrate by moving the stage at 2mm/s." This statement confirms "movement as the laser and the substrate is relative to one another… is continuous" as claimed in applicant's invention.

(b) Additionally, see figures **1**, **2** and **5**, which illustrate the laser beam moving in a lateral direction and see **col. 6 lines 29-40**, for confirmation that the laser light is irradiated onto the whole surface of the substrate by moving the substrate in one direction.

(c) Further, as stated in **col. 2**, lines **11-16**, a definition of scanning is provided by the prior art of record, where scanning means that the linear beam is superposedly irradiated while, displaced little by little, which also confirms continuous movement between the laser and the substrate, where the width of the laser beam exceeds the length of the substrate to be processed and where the scanning takes place relative to the substrate.

(d) Finally, as stated in **col. 10, lines 1-6**, "The linear laser light is irradiated while the direction of the source and drain regions of the TFT is coincident with the line direction of the linear laser light, whereby the crystal state in the carrier moving direction can be made uniform." This statement also confirms that "activating a portion of the source/drain regions by laser thermal annealing using a laser", is performed in continuous movement.

Step 7) "wherein each portion of the source/drain regions receives more than one single pulse of energy from the laser." In claim 11, specifically, "… and each pulse from the laser respectively irradiates non-identical portions of the source/drain regions."

(a) As stated in **col. 7, lines 50-60** the number of pulses used for the irradiation process being performed is 30 pulses/s and **col. 9**, **lines 24-50** shows that the activation process uses the number of pulses to anneal the source/drain regions. In addition, please refer back to the statements disclosed pertaining to claims 1 and 11, with regards to the confirmation of

continuous movement of the laser and substrate relative to one another (see **steps 4-6** as previously outlined). With these statements, it is confirmed that the portions of the source/drain regions must be irradiating "non-identical portions " simply because of the continuous movement of the laser and the substrate relative to one another to form connections of the source and drain regions of the TFTs.

With these statements, it is confirmed that the portions of the source/drain regions must be irradiating "non-identical portions " simply because of the continuous movement of the laser and the substrate relative to one another to form connections of the source and drain regions of the TFTs.

(10) Response to Argument

In response to Appellant's arguments, on page 4, paragraphs 1-3, the Examiner takes the position that Yamazaki does teach that non-identical portions of a particular source/drain region is irradiated by two or more pulses. Appellants specifically refers to column 7, lines 56-63 and column 2, lines 36-44, of embodiment 1, where Yamazaki teaches an annealing process that is performed by using a two-stage irradiation process. However, Yamazaki also teaches, in embodiment 2, shown in figure 5; column 9, lines 11-22, a different annealing process that includes a linear excimer laser (conventionally pulsed laser) that is aligned with the thin film transistors (TFT), where the source/drain regions coincide with the line direction of the linear laser light. The linear laser light irradiates the TFTs over the whole surface by a laser annealing apparatus, figure 2, while *scanning*. Yamazaki specifically, defines the term *scanning*, in column 2, lines 11-15, as "the linear laser is superposedly irradiated while displaced little by little." In addition, the scanning takes place *relative to the substrate*, where the width of the laser

beam exceeds the length of the substrate to be processed. By these statements, the Examiner takes the position that a continuous movement is obtained. In embodiment 3, Yamazaki teaches an annealing process that is performed for activating the source/drain regions. In this embodiment the annealing process may be performed by embodiments 1 *or* 2, where the Examiner takes the position that the annealing process is performed by embodiment 2, which does *not* include a two-stage irradiation process. Yamazaki does teach continuous movement of the laser annealing activation process of the source/drain regions, resulting in an irradiation of "non-identical portions of the source/drain regions", especially, since the source and drain regions coincide with the line direction of the laser.

In response to Appellant's arguments, on pages 5-7, paragraphs 4-8, the Examiner takes the position that the arguments of obviousness are considered moot. Specifically, the Appellant cites in paragraph 4, a portion of the Examiner's statements regarding to a "***Response to Arguments***" in the final rejection mailed on 10/07/04. However, the statements made by the Examiner are drawn to the rejection of claim 2 under 35 U.S.C 103(a) over Yamazaki in view of Ino. In addition, in the after-final amendment filed on 12/23/04 claim 2 has been cancelled.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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